Cost / Schedule Executive Session Director's CD-2/3a Review of the NOvA Project

June 4-6, 2006

L. Edward Temple, Jr.

Agenda (continued)

Tuesday, Jun. 05

8:00 – 8:30 AM	Cost and Schedule Executive Session (Comitium, WH2SE)	Ed Temple
8:30 – 8:45 AM	Cost and Schedule Methodology (Comitium, WH2SE)	Bill Freeman
8:45 – 10:45 AM	BREAKOUT SESSIONS	
	1) Site and Building (Confessional – WH5NE)	Steve Dixon*
	2) Commodities - Scintillator, Fiber, PVC (Snake Pit – WH2NE)	Rich Talaga*
	3) Far and Near Detector Assembly (The Req. Room – WH4NW)	Dave Ayres*
	4) Electronics and DAQ (Hornets Nest - WH8X)	Leon Mualem*
	5) Extrusion Module Production (Black Hole – WH2NW)	Ken Heller*
	6) Accelerator and NuMI Upgrades (Racetrack – WH7X)	Elaine McCluskey*
	7) Cost, Schedule and Management (Comitium, WH2SE)	John Cooper*

* Notes Breakout Session Lead

Agenda (continued)

Tuesday, Jun. 05

10:45 – 11:00AM	**BREAK** (Outside Comitium, WH2SE)
11:00 – 12:45 PM	BREAKOUT SESSIONS – Continued (Same breakouts and locations as for the 8:45 – 10:45 AM sessions)
12:45 – 1:45 PM	LUNCH (WH2 Crossover)
1:45 – 2:45 PM	NOvA Respond to Committee Questions from 1st Day (Comitium, WH2SE)
2:45 – 6:30 PM	Executive Session and Report Writing (Comitium, WH2SE) Breaks taken as necessary.

Wednesday, Jun. 06

8:00 – 9:30 PM	Subcommittee Working Sessions and Report Writing
10:00 – 2:00 PM	Committee Closeout Dry Run with working lunch (Comitium, WH2SE) Breaks taken as necessary.
2:00 PM	Closeout ((Hornets Nest - WH8X, Overflow in Racetrack – WH7X)

Cost/Schedule Review Guidance

These are CD-2 Requirements.

The cost/schedule reviews are key elements of the CD-2 Performance (Technical, Cost, Schedule) Baseline Reviews.

1) This Director's Review
2)Lehman DOE Review
3)EIR – External Independent Review?

Project Technical, Cost, and Schedule Baseline Development

To Succeed in Cost / Schedule Arena

Estimate must be
- **Complete**
  - Scope well understood and defined
    - Technical goal must be clear
    - Technology to be used to meet this goal known
    - Designate how technical systems will be acquired
      - I.e. buy, have fabricated, self fabricated
      - Buy parts / fabricate / assemble
    - How will this be accomplished
      - Self fabricate / assemble – lab or university(ies)
      - How will person power requirements be met
        - And paid for
  - All tasks defined and specified in a work breakdown structure
  - WBS dictionary
- **Documented** at lowest level of WBS and include
  - M&S – materials and services
  - SWF – salaries, wages, & fringes
  - Accompanied by schedule showing appropriate durations
  - Adders – overheads / G&A (general & administrative)
  - Escalated – shown both with and without escalation with funding profile based on laboratory/DOE/Federal budget/appropriation guidance

Cost/Schedule Review Guidance

(Continued)

Reviewable

Estimate must "roll-up" from the lowest level to the total and reviewers must be able to drill down from the top to the lowest level

Credible

Basis of estimate must be specified

- Catalog prices
- Similar work, where cost is documented
- Engineering estimates
- WAG – wild ass guess

This material forms basis for DOE approving a baseline, for Fermilab/Collaboration Project Management to measure performance and take appropriate corrective actions during execution and for Laboratory Management and DOE to monitor progress.

Cost/Schedule Review Guidance

(Continued)

Baseline Reviews

When preparing a baseline, it can be helpful to be aware of and prepared for the types of things a Director's Technical/Cost/Schedule/Management Review Committee or a DOE Baseline Review Committee will be looking for. The following provides some insight into such reviews. Review Committees are frequently broken up into subgroups which are then assigned to look at specific systems or subprojects within a project.

To be available for reviewers one week prior to the review

- Conceptual &/or Technical Design Reports
- Design Review materials (web address was provided)
  - Materials presented at most recent design review for system
- Detailed schedule for system (to be looked at during breakout sessions)
- Cost Estimate Details for system (will be provided at low levels of the WBS)
  - Including WBS Dictionary and BOE – Basis of Estimate detail sheets
  - (BOE notebooks will be available in breakout rooms)

Tabbed hardcopies of review materials and presentations to be available at the review. Enough for committee, observers, and a half dozen extras

Cost/Schedule Review Guidance

(Continued)

Technical / Cost / Schedule / Management Review Guidelines
(things reviewers are asked to do)

Technical

Examine Design Review Materials (including TDRs & CDRs) for your system
- Assess level at which **scope is understood and defined**
- Assess level that **technical aspects of the system are understood, planned, designed, procured/fabricated and/or prototyped**

Cost

Choose >~5 top level WBS elements from your system
- *Drill down* to successively lower levels of the WBS; while at each step
  - Understanding the **scope** of that element
  - Understanding the **schedule** for that element
  - Understanding the **basis of estimate** (BOE) for **both M&S and effort** for that element
  - Choose a few elements next lowest level of the WBS
    - And repeat this procedure until you get to the bottom level.
    - I.e., the lowest level of the WBS

Choose >~5 items in the system for which you have personal experience
- Interact with the responsible managers to **determine if**
  - **The Estimate is complete, documented, reviewable, and credible**

Cost/Schedule Review Guidance

(Continued)

Check that there is **a detailed BOE for all work elements** in your system

Check whether the **estimate for your system "rolls-up"** from the lowest level WBS element to the total for your system

Does each level of the WBS contain all costs from lower level WBS elements

Assess the **"bottoms up" contingency that the WBS level 3 managers would assign** their components.

Assess the **"top down" contingency analysis assignments by the Project Manager**

Schedule

Is there a detailed schedule, including a critical path, for completing the project? Are milestones appropriate in number and type identified so that the project teams, Fermilab management, and DOE can effectively track and manage progress? Based on past experience, can the proposed schedules be met? Are appropriate schedule contingencies provided? Is there a "resource loaded schedule" and plan for providing the needed resources (M&S and technical support staff and physicists)?

Cost/Schedule Review Guidance

(Continued)

Funding

Have techniques such as forward funding by collaborators and phased funding of large contracts been appropriately incorporated into the planning? Does the anticipated funding profile support the resource requirements?

Management

Is an **appropriate / adequate project organizational structure** in place and **staffed** (or are plans in place) to do the job.

Has the **appropriate project management documentation** been prepared. Is it of a quality adequate for this stage of the project? Are **appropriate / adequate management systems** (Cost and Schedule Control System / Earned Value Reporting, Critical Path Management, Risk Management, etc.) in place or planned for use during project execution?

Reviewer Assignments

Executive Summary	Ed Temple
1.0 Introduction	Dean Hoffer
2.0 Science	Heidi Schellman, and All
3.0 Site and Building (WBS 1/2.1)	Karen Hellman, Jeff Sims
4.0 Commodities – Scintillator/Fiber/PVC (WBS 1/2.2, 1/2.3 & 1/2.4)	Linda Stutte, Joe Ingraffia
5.0 Extrusion Module Production (WBS 1/2.5)	Alan Bross, Heidi Schellman
6.0 Electronics, Trigger DAQ (WBS 1/2.6 & 1/2.7)	Jonathan Lewis, Eric James
7.0 Far and Near Detector Assembly (WBS 1/2.8 & 2.9)	Richard Boyce, Pat Hurh Charlie Cooper
8.0 Accelerator Upgrades (WBS 1/2.0.1, 1/2.0.2)	Thomas Roser, Rod Gerig
9.0 NuMI Beamline Upgrades (WBS 1/2.0.3, 1.0.4) a) Beamline / Target Modifications b) Shielding	Phil Martin, Sayed Rokni
10.0 Cost and Schedule	Bill Boroski, Dean Hoffer
11.0 Project Management (WBS 1.9 & 2.10)	Mike Lindgren, Ed Temple

- Note underlined names are the primary writer.

Reviewer Assignments (continued)

12.0 Charge Questions	
TECHNICAL	
12.1 Are the technical specifications clearly stated and documented?	Heidi Schellman, Tom Roser
12.2 Can the design be built? Does the design meet the technical specifications? Is it a reasonable design?	Heidi Schellman, Tom Roser
12.3 Does the baseline design meet the project's objectives (mission need)?	Heidi Schellman, Tom Roser
COST	
12.4 Is the Work Breakdown Structure (WBS) appropriate for the project scope?	Bill Boroski, Dean Hoffer
12.5 Do the cost estimates for each WBS (or cost) element have a sound documented basis and are they reasonable?	
12.6 Does an obligation profile exist? How does it compare with the funding guidance?	
SCHEDULE	
12.7 Is the schedule well developed and appropriately structured by specifying relationships, predecessors, successors, critical path, resource loaded, etc?	Dean Hoffer, Bill Boroski
12.8 Are the durations for the activities and overall schedule reasonable and achievable with the assumed resources?	
12.9 Does the schedule contain appropriate levels of milestones, sufficient quantity of milestones for tracking progress and do they appear to be achievable?	
12.10 Does the schedule include activities for design reviews, which include assessment of the designs readiness for procuring prototypes, preproduction and production materials?	

- Note underlined names are the primary writer.

Reviewer Assignments (continued)

	MANAGEMENT	
	12.11 Is there an appropriate management organizational structure in place to accomplish the design and construction?	Mike Lindgren, Bill Boroski
	12.12 Is the organization structure well documented, responsibilities defined and appropriate for the scope of work?	
	12.13 Are there adequate staffing resources available or planned for this effort?	
	12.14 Is there a funding plan available or proposed to meet the resource requirements to realize the project?	
	12.15 Has a Risk Plan been developed, risks identified, risks analyzed, risk responses planned/implemented, risk monitoring/control process established and do they seem appropriate?	
	PROCUREMENT	
	12.16 Have the critical procurements been identified and are they included in the schedule with adequate lead time built in?	Joe Ingraffia, Mike Lindgren
	12.17 Have critical make vs. buy decisions been evaluated in conjunction with the scope and is that reflected in the baseline cost estimate, schedule and technical risk plan?	Joe Ingraffia, Mike Lindgren
	12.18 Are the Project designs final and procurement packages prepared to the degree appropriate to order materials and initiate construction as scheduled?	Joe Ingraffia, Mike Lindgren

- Note underlined names are the primary writer.

Reviewer Assignments for Breakouts

1) Site and Building (Confessional, WH5NE)	Karen Hellman, Jeff Sims
2) Commodities – Scintillator/Fiber/PVC (Snake Pit – WH2NE)	Joe Ingraffia, Linda Stutte
3) Far and Near Detector Assembly (The Req. Room – WH4W)	Richard Boyce, Charlie Cooper, Pat Hurh
4) Electronics and DAQ (Hornets Nest - WH8)	Jonathan Lewis, Eric James
5) Extrusion Module Production (Black Hole – WH2NW)	Alan Bross, Heidi Schellman
6) Accelerator and NuMI Beamline Upgrades (Racetrack – WH7X)	Rod Gerig, Phil Martin, Sayed Rockni, Thomas Roser
7), Cost, Schedule and Management (Comitium, WH2SE)	Bill Boroski, Mike Lindgren, Dean Hoffer, Ed Temple

Project's Cost & Contingency Estimate

	WBS	Items	NOvA 's Cost Estimate AY $M									
			Estimated Cost (with indirects)			Contingency Estimate			Contingency %			Total Cost
			M&S	Labor[1]	Total	M&S	Labor[1]	Total	M&S	Labor[1]	Total	
TEC	2.0	Accelerator & NuMI Upgrades	$ 13.2	$ 20.5	$ 33.7	$ 4.4	$ 6.5	$ 11.0	34%	32%	33%	$ 44.7
	2.1	Far Detector Site and Building	$ -	$ 1.9	$ 1.9	$ -	$ 0.5	$ 0.5	0%	24%	24%	$ 2.4
	2.2	Liquid Scintillator	$ 23.0	$ 0.4	$ 23.4	$ 6.1	$ 0.3	$ 6.5	27%	87%	28%	$ 29.8
	2.3	Wave-Length-Shifting Fiber	$ 12.3	$ 1.2	$ 13.6	$ 3.4	$ 0.1	$ 3.6	28%	10%	26%	$ 17.1
	2.4	PVC Extrusions	$ 28.4	$ 1.7	$ 30.1	$ 8.0	$ 0.6	$ 8.6	28%	35%	28%	$ 38.7
	2.5	PVC Modules	$ 6.8	$ 8.6	$ 15.4	$ 2.0	$ 3.7	$ 5.7	29%	43%	37%	$ 21.1
	2.6	Electronics Production	$ 14.3	$ 1.1	$ 15.4	$ 6.2	$ 0.6	$ 6.8	43%	53%	44%	$ 22.2
	2.7	Data Acquisition System	$ 1.6	$ 1.8	$ 3.4	$ 0.4	$ 0.5	$ 0.9	25%	29%	27%	$ 4.3
	2.8	Near Detector Assembly	$ 3.6	$ 0.4	$ 4.1	$ 1.5	$ 0.2	$ 1.7	40%	50%	41%	$ 5.7
	2.9	Far Detector Assembly	$ 7.9	$ 6.0	$ 13.9	$ 4.8	$ 6.0	$ 10.8	61%	100%	78%	$ 24.8
	2.10	Project Management	$ 0.6	$ 5.7	$ 6.3	$ 0.1	$ -	$ 0.1	25%	0%	2%	$ 6.4
		Subtotal Construction	**$ 111.7**	**$ 49.5**	**$ 161.2**	**$ 36.9**	**$ 19.1**	**$ 56.0**	**33%**	**39%**	**35%**	**$ 217.2**
OPC		**R&D - Accelerator**	$ 1.4	$ 7.8	$ 9.3	$ 0.4	$ 3.0	$ 3.4	30%	38%	37%	$ 12.7
		R&D - Detector	$ 4.1	$ 5.0	$ 9.1	$ 0.2	$ 0.1	$ 0.3	5%	1%	3%	$ 9.3
		Cooperative Agreement	$ 46.9	$ -	$ 46.9	$ 9.3	$ -	$ 9.3	20%	0%	20%	$ 56.2
		Operating	$ 0.2	$ 1.2	$ 1.3	$ 0.1	$ 0.6	$ 0.7	36%	51%	49%	$ 2.0
		Total OPC:	**$ 52.6**	**$ 14.0**	**$ 66.6**	**$ 10.0**	**$ 3.6**	**$ 13.6**	**19%**	**26%**	**20%**	**$ 80.2**
		TPC:	**$ 164.3**	**$ 63.5**	**$ 227.8**	**$ 46.9**	**$ 22.7**	**$ 69.6**	**29%**	**36%**	**31%**	**$ 297.4**

Notes:

[1] Labor costs presented here include all project labor from Fermilab, other DOE facilities and Universities.

Committee's Cost & Contingency Estimate

	WBS	Items	Committee's Cost Estimate AY$ $M									
			Base w/Indirects			Contingency $			Contingency %			Total Base w/Indirects and Cont.
			M&S	Labor	Total	M&S	Labor	Total	M&S	Labor	Total	
TEC	2.0	Accelerator & NuMI Upgrades			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.1	Far Detector Site and Buildings			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.1	Liquid Scintillator			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.3	Wave-Length-Shifting Fiber			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.4	PVC Extrusions			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.5	PVC Modules			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.6	Electronics Production			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.7	Data Acquisition System			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.8	Near Detector Assembly			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.9	Far Detector Assembly			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
	2.10	Project Management - Construction			$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -
		Total TEC:	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**$ -**
OPC		**R&D - Accelerator**			$ -			$ -	#DIV/0!	#DIV/0!	#DIV/0!	$ -
		R&D - Detector			$ -			$ -	#DIV/0!	#DIV/0!	#DIV/0!	$ -
		Cooperative Agreement			$ -			$ -	#DIV/0!	#DIV/0!	#DIV/0!	$ -
		Operating			$ -			$ -	#DIV/0!	#DIV/0!	#DIV/0!	$ -
		Total OPC:	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**$ -**
		TPC:	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**$ -**

Notes: